AF/2823



# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re: | Wilk *et al.* | Docket: | TI-24742 |
| Serial No.: | **09/176,422** | Examiner: | **N. Berezny** |
| Filed: | 10/21/98 | Art Unit: | **2823** |
| For: | Low Temperature Method for Forming a Thin, Uniform Oxide | | |

## REQUEST TO REINSTATE APPEAL UNDER 37 C.F.R. § 1.193

MAILING CERTIFICATE UNDER 37 C.F.R. § 1.8
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231 on
September 5, 2001.
Tina Smith
Tina Smith

September 4, 2001

Assistant Commissioner for Patents
Washington, DC 20231

Honorable Board:

Applicants request reinstatement of the appeal of this application. A Supplemental Appeal Brief is being mailed along with this request. Applicants agent thanks Examiner for the clear descriptions of the new rejections.

Applicants believe that no fee is due. However, please charge any required fee to the deposit account of Texas Instruments Incorporated, Account No. 20-0668.

Respectfully submitted,

David Denker
Reg. No. 40,987

Texas Instruments Incorporated
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## SUPPLEMENTAL APPEAL BRIEF TRANSMITTAL FORM

September 4, 2001

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September 5, 2001.
Tina Smith

Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

Transmitted herewith in triplicate is a Supplemental Appeal Brief in the above-identified application.

Applicants believe that no fee is due. However, please charge any required fee to the deposit account of Texas Instruments Incorporated, Account No. 20-0668. **Three copies of this sheet are enclosed.**

Respectfully submitted,

David Denker
Reg. No. 40,987

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## SUPPLEMENTAL APPEAL BRIEF

Applicants' SUPPLEMENTAL APPEAL BRIEF is submitted pursuant to 37 C.F.R. §1.193 and concurrently with a REQUEST TO REINSTATE APPEAL UNDER 37 C.F.R. § 1.193.

Applicants appeal the Examiner's rejection dated June 5, 2001, rejecting claims 1-25.

Applicants are supplementing the original appeal brief with responses to the new grounds of rejection contained in the June 5, 2001 Office Action. The statements and arguments of the original appeal brief still apply. The first five sections of the original brief—Real Party In Interest; Related Appeals And Interferences; Status of the Claims on Appeal; Status of Amendments Filed After Final Rejection; Summary of the Invention, and the Claims Appendix—remain unchanged and are repeated by reference .

The June 5, 2001 Office Action placed the new rejections before the original rejections that were at issue in the Appeal Brief. This Supplemental Appeal Brief will generally follow that sequence.

## Issues Presented for Review

**New Issues**

**1.** Whether claims 1 - 25 contain subject matter not enabled by the specification, as required by 35 U.S.C. § 112, first paragraph.

**2.** Whether claims 1 - 17 and 23 contain subject matter not enabled by the specification, as required by 35 U.S.C. § 112, first paragraph.

**3.** Whether claims 23 - 25 contain subject matter not enabled by the specification, as required by 35 U.S.C. § 112, first paragraph.

**4.** Whether claim 6 contains subject matter not enabled by the specification, as required by 35 U.S.C. § 112, first paragraph.

**Original Issues**

**5.** Whether claim 18 is rendered obvious under 35 U.S.C. § 103 by the Fujishiro *et al.* patent (Fujishiro '571) in combination with the Nayar *et al.* article in ELECTRONIC LETTERS (Nayar article).

**6.** Whether claims 24 and 25 are rendered obvious under 35 U.S.C. § 103 by Fujishiro '571 and the Nayar article, further in view of the Wolf text, Vol. 3, p. 422-423 (Wolf text).

**7.** Whether Claims 1 - 13 are rendered obvious under 35 U.S.C. § 103 by Fujishiro '571 and the Nayar article, in view of the Choquette *et al.* patent (Choquette '687).

**8.** Whether Claim 23 is rendered obvious under 35 U.S.C. § 103 by Fujishiro '571 and the Nayar article, in view of Choquette '687, and further , in view of the Wolf text.

**Grouping of Claims**

Claims 1 - 5 and 7 - 17 stand and fall together. Claims 18 - 22 stand and fall together. Claims 24 - 25 stand and fall together. Claims 6 and 23 each stand independently.

## ARGUMENTS REGARDING THE NEW REJECTIONS

**Claims 1 - 25 are enabled by the specification**

The specification teaches how to form a uniformly thick, gate oxide film

**A.** The Office Action asserts that the disclosure fails to enable ordinary artisans to produce uniform gate oxides. Applicants respectfully disagree.

The written description—especially pages 7 - 12 and the figures—provide detailed guidance to ordinary artisans about how to produce uniformly thick, gate oxide films. Among items specifically detailed include:

- other structures[1],
- surface preparation[2],
- temperature stabilization[3],
- temperatures[4],
- pressures[5],
- oxygen concentration[6]
- electrical properties produced[7],
- ozone exposure and ozone generation[8],
- uniformity achieved and how to improve the uniformity[9],
- time dependence[10],
- etc.

Applicants submit that it is clear that these detailed descriptions of how-to-apply Applicants' method enable ordinary artisans to make uniformly thick, gate oxide films without undue experimentation. Applicants note that the scope of the claims closely corresponds to the uniformity described on page 10[11]. Additionally, the Office Action does not dispute the objective truth of the uniformities described in the specification. As such, the enabling requirement has been met.[12] Applicants request allowance of claims 1 - 25.

<u>The Office Action does not show that Applicants' disclosed process is identical to the Nayar article's process</u>

**B.** The Office Action's argument is based on the premise that Applicants' disclosed process is identical to the Nayar article's process. However, the Office Action does not show that the

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[1] e.g., Appl., [7:8].
[2] e.g., Appl., [7:11 - 7:25].
[3] e.g., Appl., [8:1 - 8:21].
[4] e.g., Appl., [8:5 - 8:9].
[5] e.g., Appl., [8:11].
[6] e.g., Appl., [8:10].
[7] e.g., Appl., [8:25].
[8] e.g., Appl., [9:1 - 9:19] and the preliminary amendment dated 9/28/98 referenced in the declaration.
[9] e.g., Appl., [10:1 - 10:14].
[10] e.g., Appl., [10:17 - 10:23].
[11] Thus this is not a case where Examiner asserts that the "scope of protection provided by that claim is not adequately enabled".
[12] A "specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as in compliance with the enabling requirement of the first paragraph of §112 unless there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support." Fiers v. Revel, 984 F.2d 1164, 1171; 25 U.S.P.Q.2d 1601 (Fed. Cir. 1993).

processes are identical. Applicants have agreed with Examiner that the processes are similar. However, Applicants respectfully disagree that the processes—as disclosed—are identical.

As noted above, Applicants give specific guidance on many aspects of their low temperature method of forming a thin gate oxide on a silicon surface. These aspects include other structures, surface preparation, temperature stabilization, temperatures, pressures, oxygen concentration, electrical properties produced, ozone exposure and ozone generation, uniformity achieved and how to improve the uniformity, time dependence, etc.

The Nayar article also gives specific guidance—in at least most of these areas. If there is an area where there is no specific guidance from the Nayar article, there is no showing that the process is identical. Additionally, in some areas where both teachings give specific guidance, Applicants and the Nayar article do not always teach the same methods[13]. Given the divergence of teachings, and the unknown amount of overlap in some areas—it is not surprising that the results achieved differ.

<u>The Appeal Brief does not state that Nayar's process cannot produce uniformly thick gate oxides.</u>

**C.** Applicants agent has not admitted that "ordinary artisans would not succeed in using Nayar to produce a uniformly thick gate oxide." Instead, the Appeal Brief states

- "The Nayar article does not mention that the oxide is highly uniform. Instead, the article mentions that the thickness measurements are averages. Additionally, an examination of the Nayar article fig. 2 shows that at 250° C, the oxide thickness may not be well behaved. Ordinary artisans would not be assured that the Nayar article oxides had sufficient thickness uniformity for a conventional gate oxide."[14]
- "However, there is no evidence that the Nayar article's useful method creates uniformly thick layers—to which Applicants' claims are limited."[15]
- "Applicants submit that uniform thickness is not an inherent property of an ordinary oxide. Thus, there is no evidence that the cited references teach how to achieve a critical limitation of the claim."[16]
- "Additionally, there is no evidence that the postulated combination achieves a critical limitation of the claim—that the gate oxide be uniformly thick."[17]

[13] e.g., surface preparation, temperature stabilization, and pressures.
[14] Brief, [4:20].
[15] Brief, [5:8].
[16] Brief, [5:13].
[17] Brief, [8:5].

These statements do not pass judgment upon the thickness uniformity of the Nayar article method. Instead, they are argument about what the Nayar article would teach an ordinary artisan—before the artisan duplicated Nayar's method in their own lab.

**Claims 1 - 17 and 23 are enabled by the specification**

The specification incorporates Appl. No. 08/904,009 by reference

**D.** The Office Action asserts that the disclosure fails to enable ordinary artisans to produce "clean atomically flat, silicon surfaces". Applicants respectfully disagree. Page 1, line 15 of the application incorporates by reference another application by Wilk *et al*—TI-22960, filed 7/31/97, titled "Method For Thin Film Deposition On Single-Crystal Semiconductor Substrates". This referenced application has since matured into patent 6,020,247. Method For Thin Film Deposition On Single-Crystal Semiconductor Substrates fully discloses how to make clean, atomically flat, silicon surfaces. A copy of the patent is enclosed for the Board's convenience. Applicants request allowance of claims 1 - 17 and 23.

**Claims 23 - 25 are enabled by the specification**

Applicants teach a method of forming oxides with greater than 10 MV/cm breakdown voltage.

**E.** The Office Action notes that the disclosure fails to disclose which process variations would enable ordinary artisans to control the breakdown voltage.

Applicants' disclosure states "This ozone-based method can routinely achieve breakdown voltages above 10 MV/cm, such as 12 to 13 MV/cm." Ordinary artisans will understand that the breakdown voltages achieved will vary somewhat—both from lot-to-lot, and as process parameters are varied. Applicants have given detailed guidance on some process parameter variations and general guidance on others. The lack of specific guidance on how to control the breakdown voltage does not prevent the specification from enabling the claimed invention. Applicants request allowance of claims 23 - 25.

**Claim 6 is enabled by the specification**

Applicants teach how to form oxides using energetic ozone sources

**F.** The Office Action asserts that "wherein at least part of the atmosphere that does not contact the silicon surface includes an ozone plasma" is not enabled. Applicants clearly teach how to practice the invention—even if the ozone source is energetic.[18]

Applicants did not state that ordinary artisans could not use the Nayar article's method to produce the claimed limitation. Instead, Applicants stated "Applicants do not see where the cited art teaches or suggests using a remote ozone plasma. Instead, the Nayar article teaches a UV/ozone method to oxidize silicon."[19]

These statements do not pass judgment upon the whether the Nayar article could be combined with an ozone plasma. Instead, they are argument about what the Nayar article would teach an ordinary artisan. Applicants request allowance of claim 6.

## ARGUMENTS REGARDING THE ORIGINAL REJECTIONS

Applicants repeat the arguments presented in the March 12 brief by reference.

[18] "Energetic ozone sources can be used, but it is preferable to keep the any excited ozone species from contacting the wafer." Appl. [9:7].
[19] Brief [7:13].

## CONCLUSION

Claims 1 - 25 are enabled by the specification. The written description provides detailed guidance to ordinary artisans about how to produce uniformly thick, gate oxide films. The scope of the claims closely corresponds to the uniformity described on page 10. The Office Action does not dispute the objective truth of the uniformities described in the specification. Additionally, the Office Action does not show that Applicants' disclosed process is identical to the Nayar article's process.

Claims 1 - 17 and 23 are enabled by the specification. The specification incorporates Appl. No. 08/904,009 by reference.

Claims 23 - 25 are enabled by the specification. Applicants teach a method of forming oxides with greater than 10 MV/cm breakdown voltage.

Claim 6 is enabled by the specification. Applicants teach how to form oxides using energetic ozone sources.

Original Rejections

Claim 18 and its dependants are patentable over Fujishiro '571 and the Nayar article. Ordinary artisans would not have a reasonable expectation of success since the Nayar article teaches oxides that do not have characteristics that ordinary artisans look for in a conventional gate dielectric. Additionally, there is no evidence that the postulated combination achieves a critical limitation of the claim—that the gate oxide be uniformly thick.

Claims 24 and 25 are patentable over Fujishiro '571, the Nayar article, and the Wolf text. The postulated combination does not teach how to achieve another critical limitation of the claims—that the method create gate oxide films with breakdown voltages greater than 10 MV/cm or 12 MV/cm.

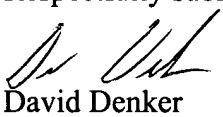
Claim 1 and its dependants are patentable over Fujishiro '571, the Nayar article, and Choquette '687. The arguments for claim 18 above are equally applicable to claim 1, and ordinary artisans would not reasonably expect Choquette '687's GaAs process to produce the claimed atomically flat, silicon surface.

Fujishiro '571, the Nayar article, and Choquette '687 do not render claim 6 obvious. Claim 6 is dependant upon an allowable base claim, and the cited art does not teach or suggest a remote ozone plasma.

Applicants believe that the application is in condition for allowance. However, should the honorable Board have any comments or suggestions, Applicant respectfully requests that the honorable Board contact the undersigned in order to quickly resolve any outstanding issues.

Please charge any required fee to the deposit account of Texas Instruments Incorporated, Account No. 20-0668.

Respectfully submitted,



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